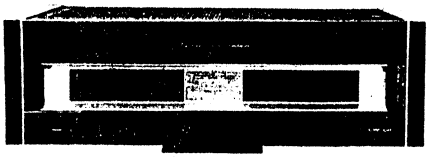
PIONEER

Service Manual

CIRCUIT DESCRIPTIONS
REPAIR & ADJUSTMENTS



ORDER NO.
ARP1185-A

STEREO POWER AMPLIFIER

M-90(BK)

MODEL M-90 (BK) COMES IN FIVE VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Power requirement	Export destination
KU	AC120V only	U.S.A.
HE	AC220V, 240V (switchable) *	European continent
HEZ	AC220V, 240V (switchable) *	West Germany
HB	AC220V, 240V (switchable) *	United Kingdom
S/G	AC110V, 120V, 220V, 240V (switchable)	U.S. Military

*Change the primary wiring of the power transformer.

- **This service manual is applicable to the HEZ type.**
- **As to the HE, HB, KU and S/G types, please refer to the additional service manual (ARP1206).**

CONTENTS

1. SPECIFICATIONS 2
2. PANEL FACILITIES 3
3. PARTS LOCATIONS 4
4. EXPLODED VIEWS AND PARTS LIST 6
5. P.C. BOARDS CONNECTION DIAGRAM 11
6. SCHEMATIC DIAGRAM 15
7. ELECTRICAL PARTS LIST 20
8. BLOCK DIAGRAM 25
9. CIRCUIT DESCRIPTION 27
10. IC DESCRIPTIONS 28
11. PACKING 29
12. SAFETY INFORMATION 29

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
TEL: (213) 420-5700
PIONEER ELECTRONIC (EUROPE) N.V. Keetberglaan 1, 2740 Beveren, Belgium TEL: 03/775-28-08
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia
TEL: (03) 580-9911

YG © JUNE 1986

1. SPECIFICATIONS

Amplifier Section

Continuous average power output is 200 watts* per channel, min., at 8 ohms from 20 Hertz to 20,000 Hertz with no more than 0.003% total harmonic distortion.

DIN power (both channels driven)
1 kHz, 0.7%, 8 Ω ..... 250 W + 250 W
Dynamic power (EIA test signal)
8 Ω ..... 300 W + 300 W
4 Ω ..... 550 W + 550 W
2 Ω ..... 800 W + 800 W
Harmonic distortion
20 Hz – 20 kHz, 200 W, 8 Ω 0.003%
Cross modulation distortion (50 Hz: 7 kHz = 4:1)
During effective output 0.002%
Input terminals (sensitivity/input impedance)
CONTROL AMP IN, CD DIRECT IN, LINE DIRECT IN .....
1 V/50 kΩ
Frequency response
CONTROL AMP IN, CD DIRECT IN, LINE DIRECT IN,
20 Hz – 20 kHz ..... +0 dB/ −0.1 dB
SN ratio (short circuit, A network)
CONTROL AMP IN, CD DIRECT IN, LINE DIRECT IN .....
125 dB

Power section, etc.

Power requirements
European model ..... AC 220 V~, 50/60 Hz
U.K., Australian models ..... AC 240 V~, 50/60 Hz
U.S., Canadian models ..... AC 120 V, 60 Hz
Other destination models ..... ~AC 110 V/120 V/
220 V/240 V (switchable), 50/60 Hz
Power consumption
European, U.K., Australian models ..... 1,300 W
U.S., Model ..... 430 W
Other destination models ..... 430 W
External dimensions ..... 457 (W) x 430 (D) x 154 (H) mm.
18 (W) x 16-7/8 (D) x 6-1/16 (H) in
Weight ..... 22.6 kg (49 lb 13 oz)

Accessories

Operating Instructions 1
Pin-plug cord 1

NOTE:

- *Specifications and design subject to possible modification without notice due to improvements.*
- **Measured pursuant to the Federal Trade Commission's Trade Regulation rule on Power Claims for Amplifier.*

Precautions for installation

To ensure optimum sound quality, observe the following precautions.

- This unit is heavy. Be sure to install it on a firm base which can support its weight. Also, to prevent the flow of cooling air from being blocked off, do not place the unit on soft material such as a carpet or cushion, or install it in a confined space. When installing the unit in a rack, provide adequate space around it to allow heat to dissipate.
- To prevent the control amplifier from picking up noise due to leakage flux from the power amplifier when the control amplifier and power amplifier are installed adjacent to each other, install the control amplifier on the right of the power amplifier. Also, if you install the control amplifier above or below the power amplifier, place a partition between them to separate them by at least 10 cm from each other.
- Install the unit on a level surface so that the feet of the unit are all touching the installation surface.

2. PANEL FACILITIES

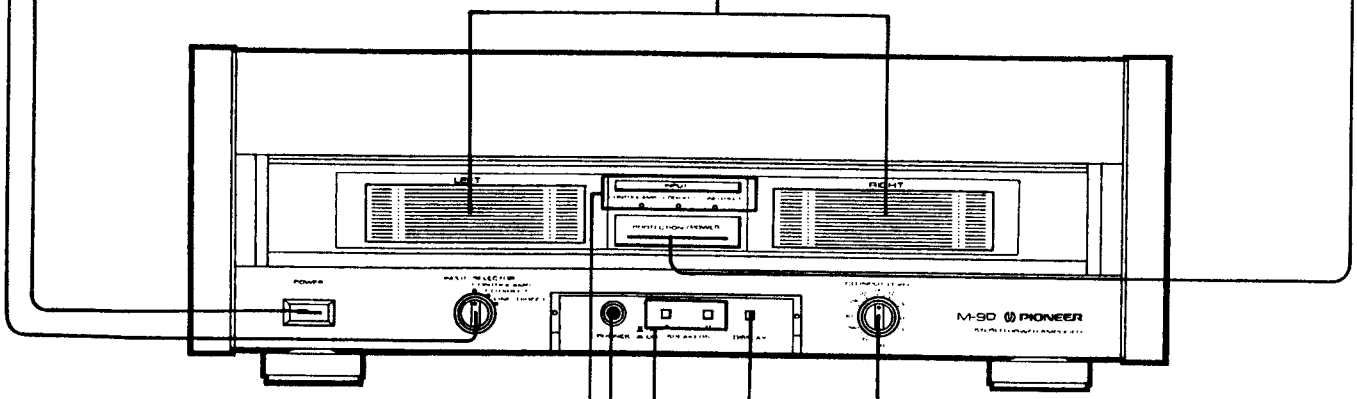
FRONT PANEL

INPUT SELECTOR
Use to select the component you wish to play back (amplify).
[CONTROL AMP]—The component connected to the control amplifier.
[CD DIRECT]— The compact disc player connected to the rear panel CD DIRECT IN terminals.
[LINE DIRECT]—The audio component connected to the rear panel LINE DIRECT IN terminals.

PROTECTION/POWER indicator
Lights when the power is turned ON.
Red (protection): Lights immediately after turning on the power, or in the event of a malfunctioning input from the control amplifier. When lighted, the amplifier will not operate.
Yellow (power): Indicates normal operating condition.

POWER switch
Press to turn power to this unit ON/OFF.

Power level meters
When the display selector switch is in the ON position, these meters display the power level. The meters feature a "peak hold" function which allows the meters to remain lighted for 0.2 to 0.3 seconds after reaching a peak value.



INPUT indicator
Indicates the position of the input selector control.

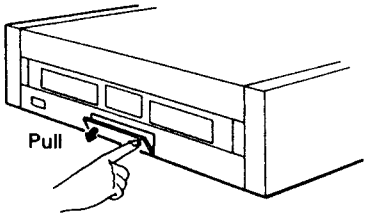
DISPLAY selector switch
Use to turn the power level meters ON/OFF.
In the OFF condition, the meters will not be displayed.

PHONES jack
When using headphones, connect their plug here.

CD/LINE INPUT LEVEL control
Use to adjust the input level connected to the rear panel CD DIRECT IN and LINE DIRECT IN terminals.

SPEAKERS selector switch
Use to select the speaker system used.
[A]— Sound is heard from the speaker systems connected to the SPEAKERS A terminals.
[B]— Sound is heard from the speaker systems connected to the SPEAKERS B terminals.
Turn this switch OFF when using headphones.

Method of opening cover

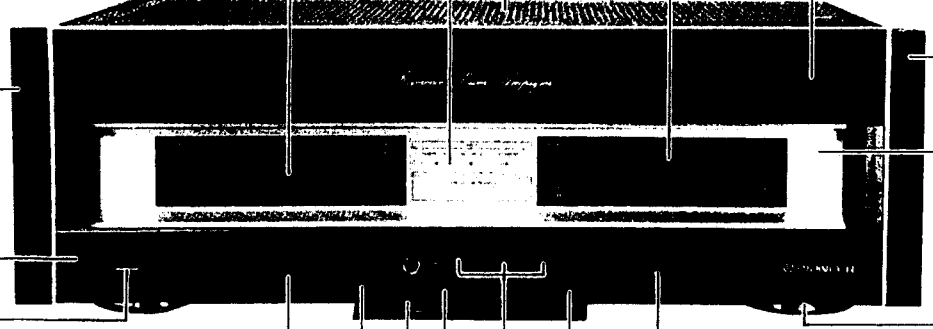


3. PARTS LOCATION

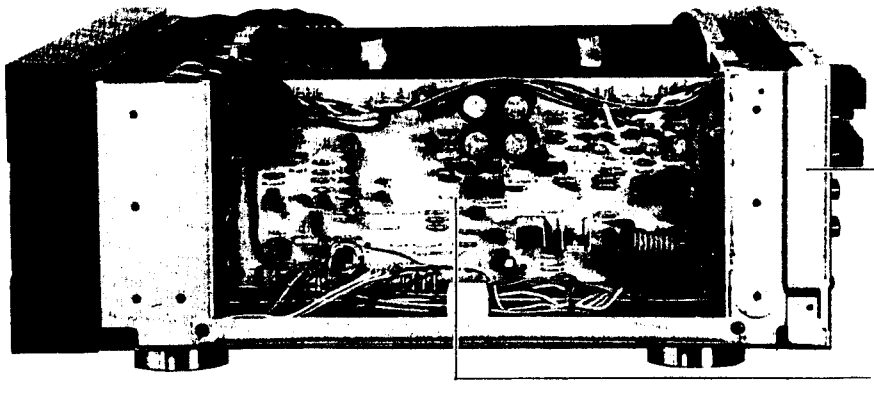
NOTES:

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts marked by " ⊙ " are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

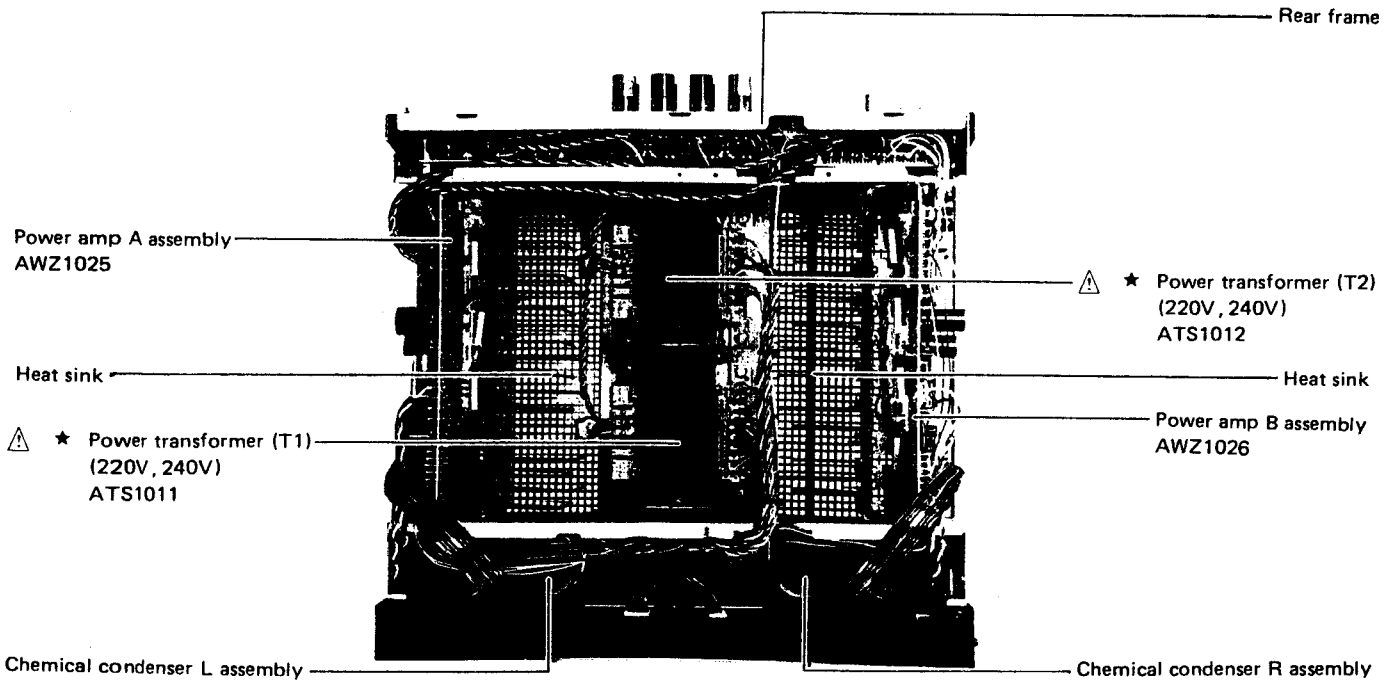
Front Panel View



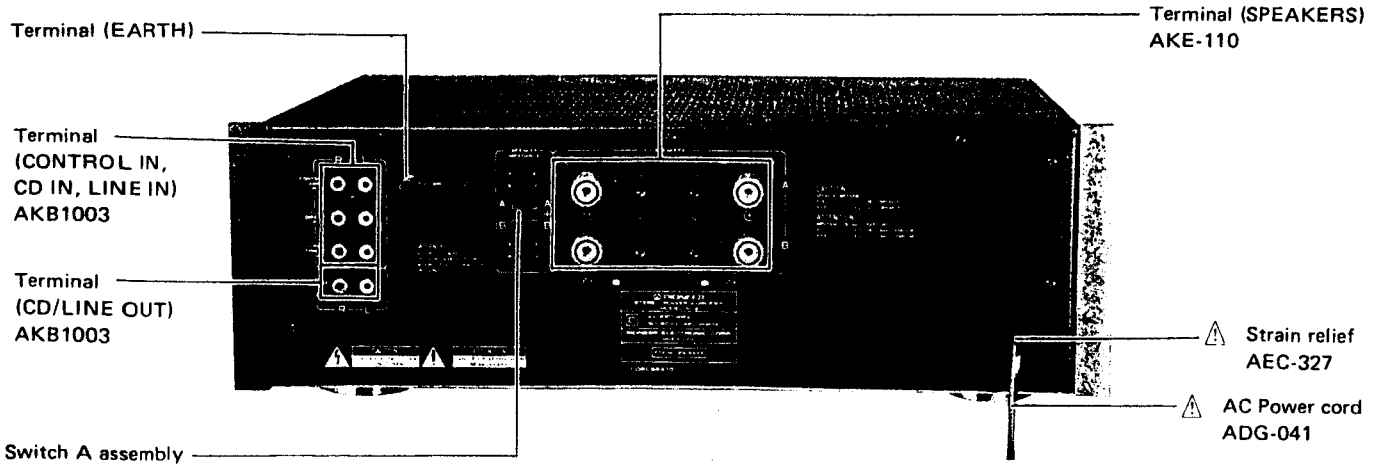
Side View with Bonnet Case Removed



Top View with Bonnet Case Removed



Rear Panel View



4. EXPLODED VIEWS AND PARTS LIST

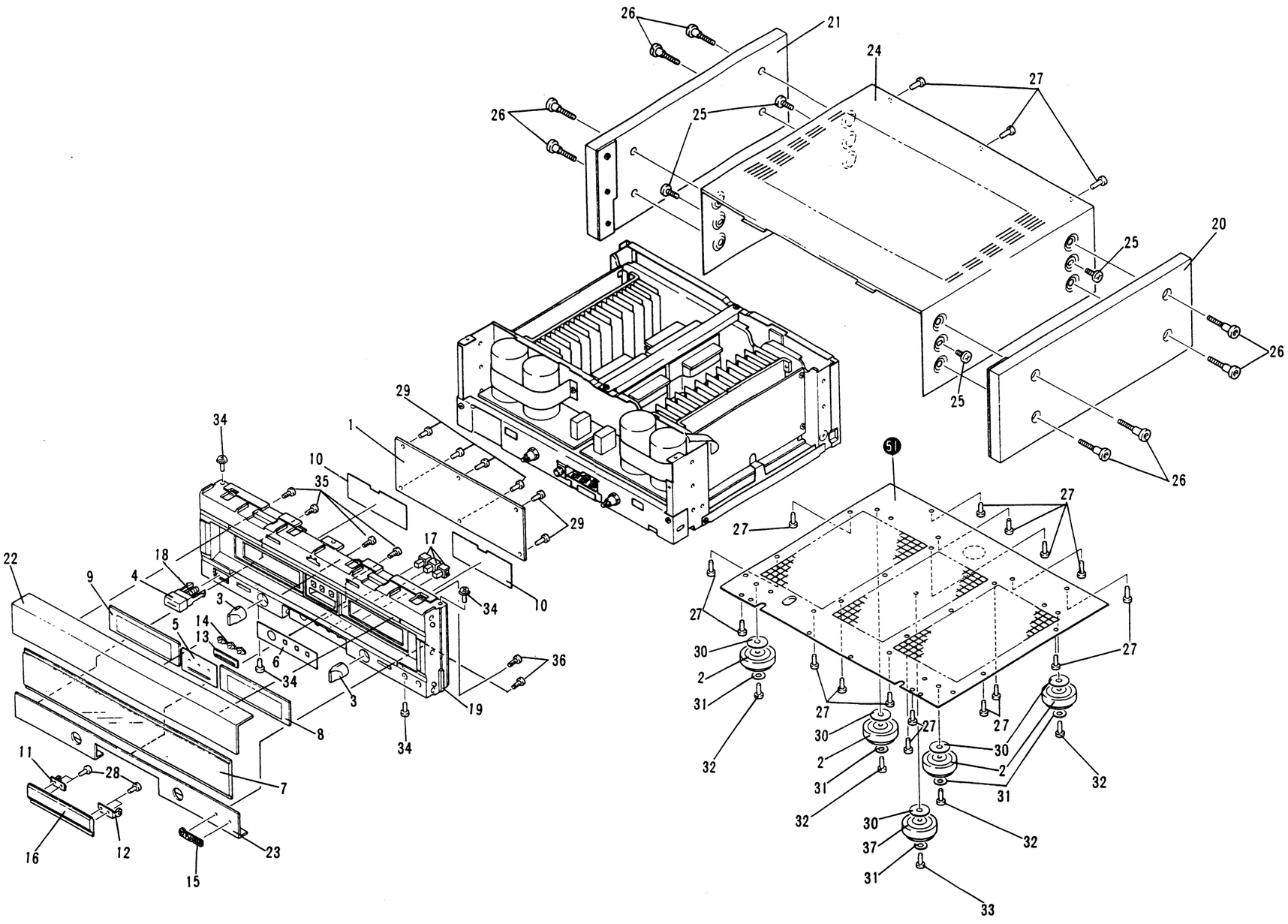
NOTES:

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts marked by " ⊙ " are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

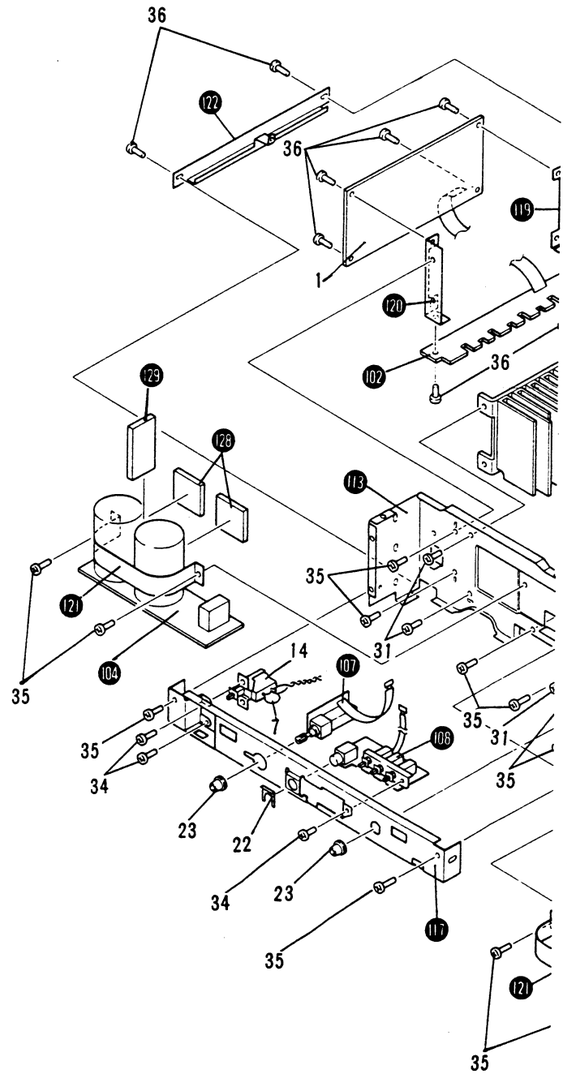
Parts List of Exterior

Mark	No.	Part No.	Description
	1	AWZ1037	FL assembly
	2	AMR1047	Leg assembly
	3	AAB1002	Knob (INPUT SELECTOR, CD INPUT LEVEL)
	4	AAD1012	Knob (POWER)
	5	AAH1002	Indicator plate
	6	AAK1021	Seat panel
	7	AAK1028	Acrylic plate
	8	AAK1029	Meter panel (R)
	9	AAK1030	Meter panel (L)
	10	AAK1031	Filter
	11	AAK1032	Door arm (L)
	12	AAK1033	Door arm (R)
	13	AAK1036	Indicator lens A
	14	AAK1075	Lens
	15	AAM1001	Name plate
	16	AAN1008	Door
	17	AAY-251	Knob (DISPLAY, SPEAKERS)
	18	ABH1005	Coil spring
	19	AMB1014	Panel bass
	20	AMS1003	Side board R
	21	AMS1004	Side board L
	22	ANB1004	Front panel A
	23	ANB1007	Front panel B
	24	ANE1006	Bonnet case
	25	FBT40P080FZK	Screw
	26	ABA1002	Decorative screw
	27	ABA1006	Screw
	28	CMZ30P060FZK	Screw
	29	ABA-298	Screw
	30	ABE1002	Washer
	31	ABE1003	Washer
	32	ABA1007	Screw
	33	VMZ30P120FCU	Screw
	34	ABA1011	Screw
	35	VMZ30P060FMC	Screw
	36	VMZ30P080FMC	Screw
	37	AMR1102	Leg assembly
	51		Bottom plate

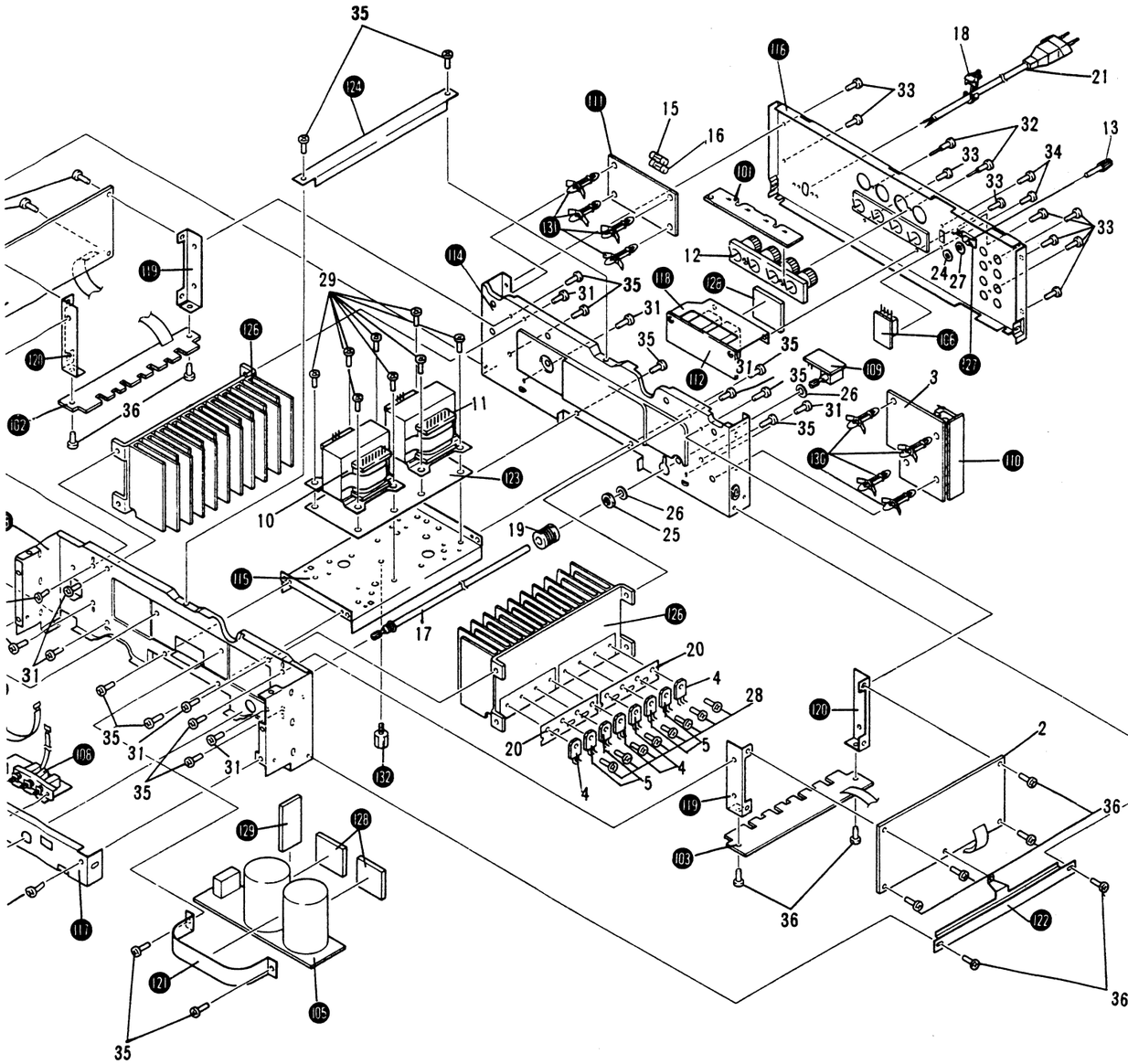
Exterior



Interior



NOTE:
The sound quality of parts with the ⚠ mark denotes that these are failsafe parts. Be sure that the designated parts are in the positions prescribed.



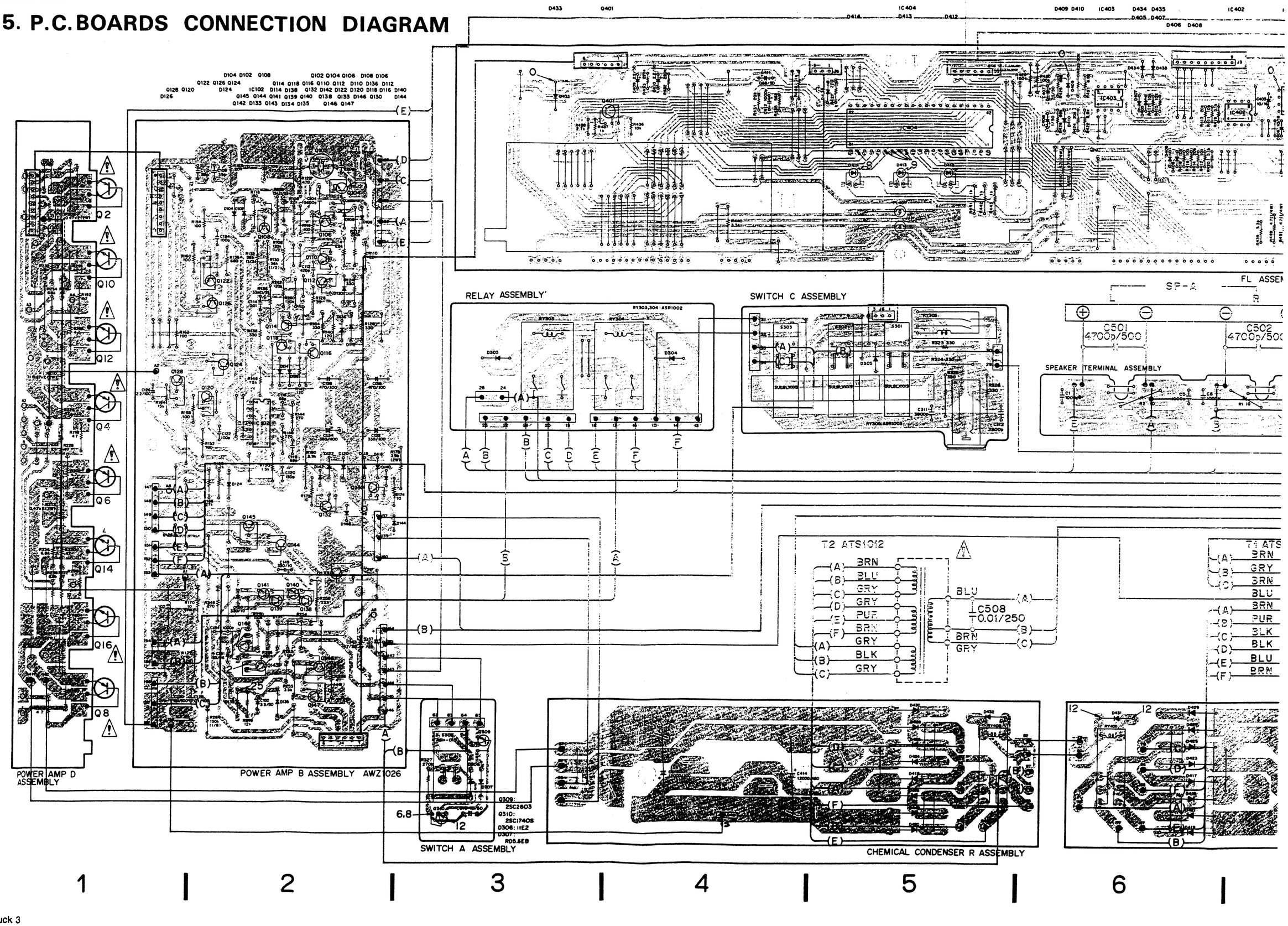
Parts List of Interior

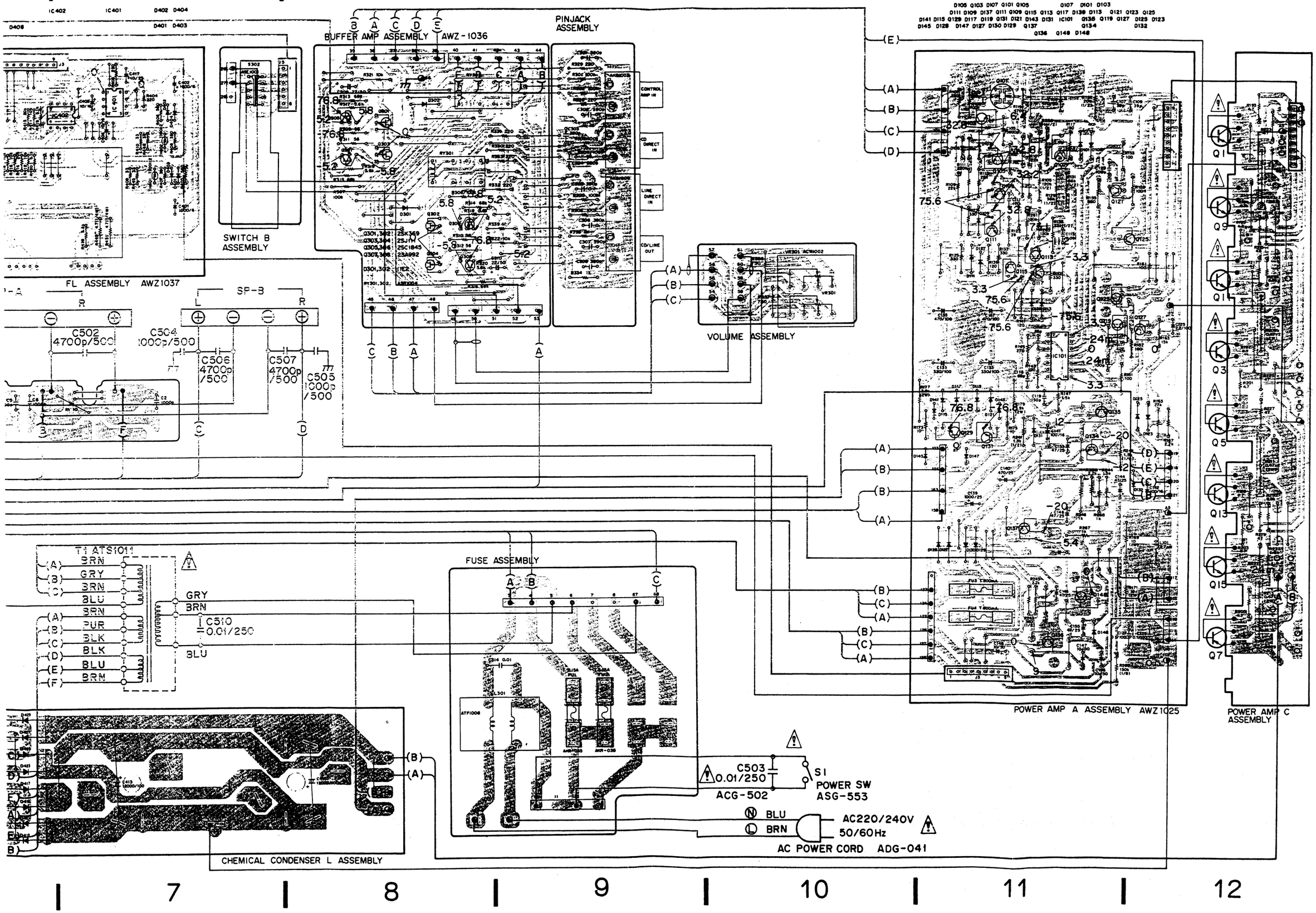
Mark	No.	Part No.	Description
	1	AWZ1025	Power amp A assembly
	2	AWZ1026	Power amp B assembly
	3	AWZ1036	Buffer amp assembly
★★	4	2SA1516P(A)	Transister (Q1–Q8)
★★	5	2SC3907P(A)	Transister (Q9–Q16)
	6	ACG-019	Capacitor (C509)(0.01μF/150V)
	7	ACG-502	Capacitor (C503, C508, C510)
	8	CKDYB102K500	Ceramic capacitor (C504, C505)
	9	CKDYB472K500	Ceramic capacitor (C501, C502, C506, C507)
⚠ ★	10	ATS1011	Power transformer (T1) (220V, 240V)
⚠ ★	11	ATS1012	Power transformer (T2) (220V/240V)
	12	AKE-110	Terminal 4P (SPEAKER)
	13	AKM-039	Terminal
	14	ASG-553	Switch (POWER)
⚠ ★★	15	AEK-031	Fuse (FU3, FU4)(T800mA)
⚠ ★★	16	AEK-042	Fuse (FU1, FU2)(T3.15A)
	17	AXA1001	Long shaft assembly
⚠	18	AEC-327	Strain rerief
	19	AEP-098	Unibersal joint
	20	AMR1021	Mica sheet
⚠	21	ADG-041	AC Power cord
	22	AKF-102	Mount plate
	23	ABN-028	Nut
	24	NK70FUC	Nut
	25	NK90FUC	Nut
	26	ABE1001	Washer
	27	WG70FUC	Washer
	28	ABA-297	Screw
	29	ABA1016	Screw
	31	ABA1007	Screw
	32	ABA1008	Screw (3x10)
	33	ABA1006	Screw (3x12)
	34	VMZ30P060FCU	Screw
	35	ABA1009	Screw
	36	ABA1011	Screw
	37	VMZ30P120FCV	Screw

Mark	No.	Part No.	Description
	101		SP Terminal A assembly
	102		Power amp C assembly
	103		Power amp D assembly
	104		Chemical condenser L assembly
	105		Chemical condenser R assembly
	106		Switch A assembly
	107		Switch B assembly
	108		Switch C assembly
	109		Volume assembly
	110		Terminal assembly
	111		Fuse assembly
	112		Relay assembly
	113		Front frame
	114		Rear frame
	115		Frame (Transformer frame)
	116		Rear panel
	117		Panel stay
	118		P.C.B. Holder-F
	119		P.C.B. Holder-A
	120		P.C.B. Holder-B
	121		Holder (Chemical condenser)
	122		Side frame
	123		Damper plate
	124		Center frame
	125		.....
	126		Heat sink
	127		Earth plate
	128		Shield cushion
	129		Cushion
	130		P.C.B. Support
	131		P.C.B. Support
	132		Sound pillar

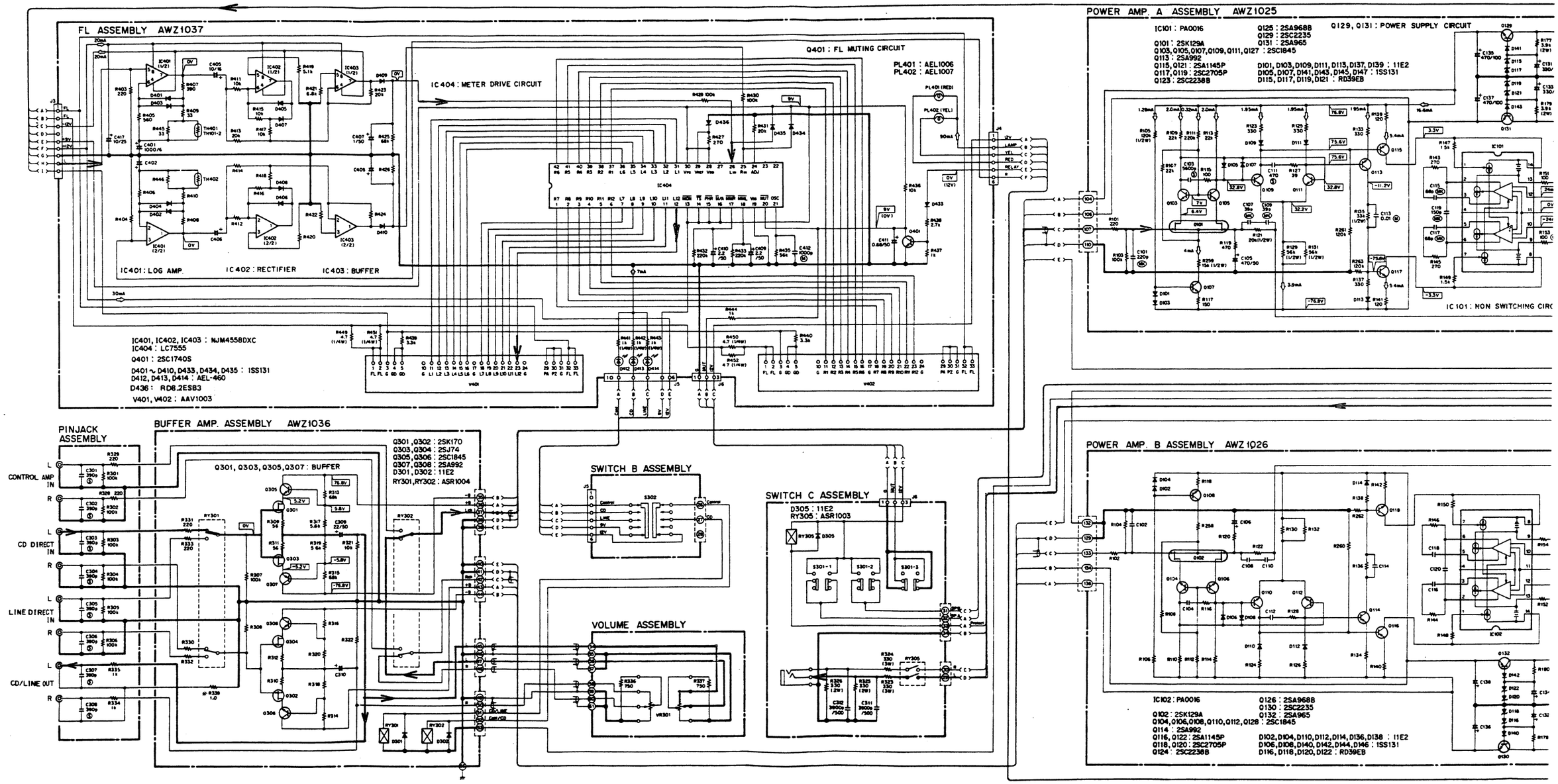
NOTE:
The sound quality of parts with the [redacted] mark denotes that these are failsafe parts. Be sure that the designated parts are in the positions prescribed.

5. P.C.BOARDS CONNECTION DIAGRAM

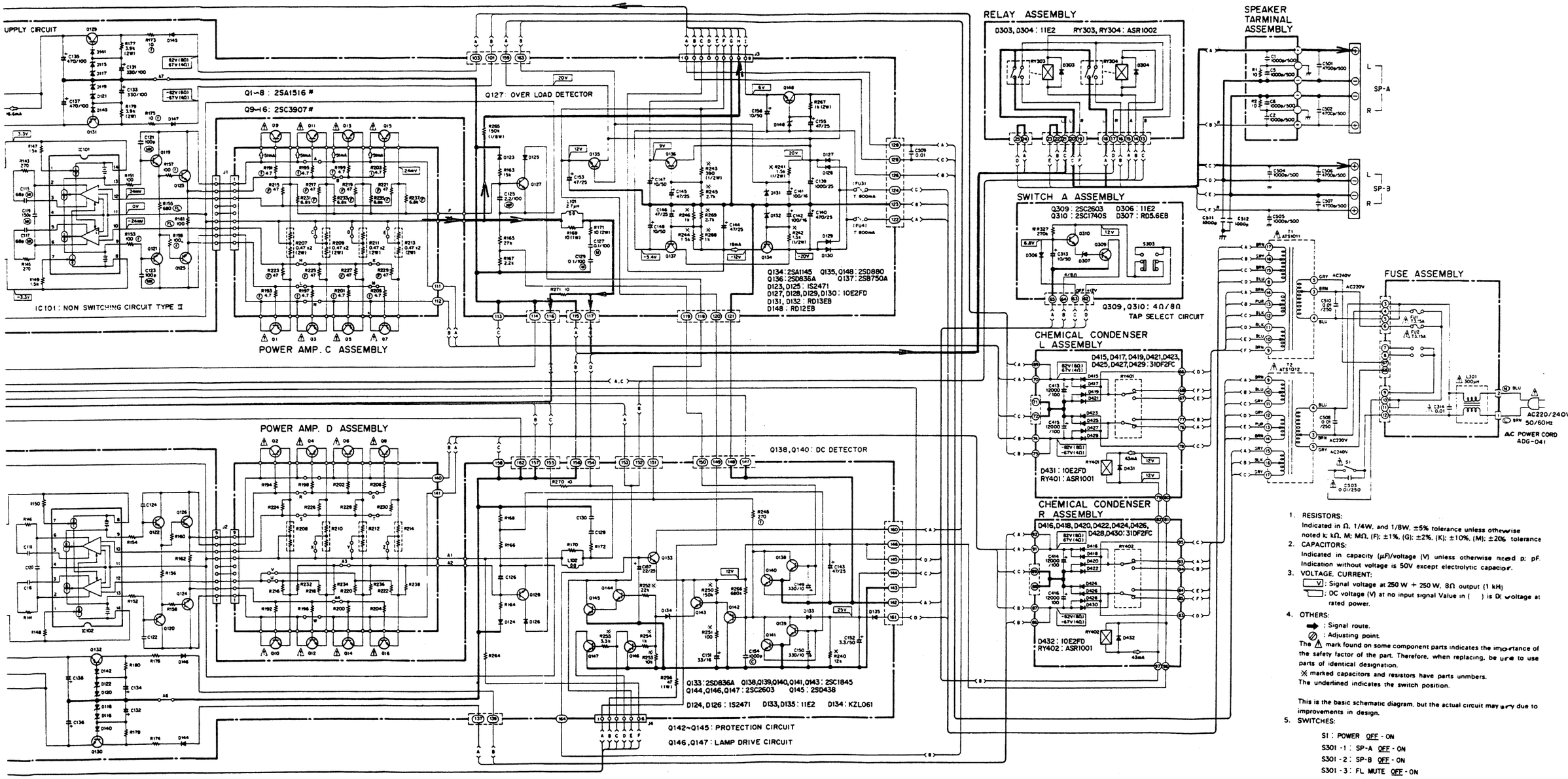



7
8
9
10
11
12
A
B
C
D
BUFFER AMP ASSEMBLY AWZ-1036
PINJACK ASSEMBLY
SWITCH B ASSEMBLY
FL ASSEMBLY AWZ1037
VOLUME ASSEMBLY
SP-A
SP-B
C502 4700p/500
C504 1000p/500
C506 4700p /500
C507 4700p /500
C505 1000p /500
T1 ATS1011
C510 0.01/250
FUSE ASSEMBLY
CHEMICAL CONDENSER L ASSEMBLY
C503 0.01/250
ACG-502
S1 POWER SW ASG-553
AC220/240V 50/60Hz
AC POWER CORD ADG-041
POWER AMP A ASSEMBLY AWZ1025
POWER AMP C ASSEMBLY

6. SCHEMATIC DIAGRAM



NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.


POWER SUPPLY CIRCUIT
IC101 : NON SWITCHING CIRCUIT TYPE II
Q1~8 : 2SA1516 #
Q9~16 : 2SC3907 #
POWER AMP. C ASSEMBLY
Q127 : OVER LOAD DETECTOR
Q134 : 2SA1145 Q135, Q148 : 2SD880
Q136 : 2SD636A Q137 : 2SB750A
D123, D125 : 1S2471
D127, D128, D129, D130 : 10E2FD
D131, D132 : RD13EB
D148 : RD12EB
POWER AMP. D ASSEMBLY
Q138, Q140 : DC DETECTOR
Q133 : 2SD836A Q138, Q139, Q140, Q141, Q143 : 2SC1845
Q144, Q146, Q147 : 2SC2603 Q145 : 2SD438
D124, D126 : 1S2471 D133, D135 : 11E2 D134 : KZL061
Q142~Q145 : PROTECTION CIRCUIT
Q146, Q147 : LAMP DRIVE CIRCUIT
RELAY ASSEMBLY
D303, D304 : 11E2 RY303, RY304 : ASR1002
SWITCH A ASSEMBLY
Q309 : 2SC2603 D306 : 11E2
Q310 : 2SC1740S D307 : RD5.6EB
Q309, Q310 : 4Ω/8Ω
TAP SELECT CIRCUIT
CHEMICAL CONDENSER L ASSEMBLY
D415, D417, D419, D421, D423, D425, D427, D429 : 31DF2FC
D431 : 10E2FD
RY401 : ASR1001
CHEMICAL CONDENSER R ASSEMBLY
D416, D418, D420, D422, D424, D426, D428, D430 : 31DF2FC
D432 : 10E2FD
RY402 : ASR1001
SPEAKER TARMINAL ASSEMBLY
SP-A
SP-B
FUSE ASSEMBLY
AC220/240V 50/60Hz
AC POWER CORD ADG-041

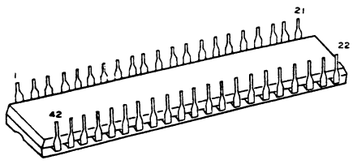
1. RESISTORS:
   Indicated in Ω, 1/4W, and 1/8W, ±5% tolerance unless otherwise noted k: kΩ, M: MΩ, (F): ±1%, (G): ±2%, (K): ±10%, (M): ±20% tolerance
2. CAPACITORS:
   Indicated in capacity (μF)/voltage (V) unless otherwise noted p: pF. Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE, CURRENT:
   [V] : Signal voltage at 250 W + 250 W, 8Ω output (1 kHz)
   [ ] : DC voltage (V) at no input signal Value in ( ) is DC voltage at rated power.
4. OTHERS:
   ➡ : Signal route.
   ⊘ : Adjusting point.
   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
   ※ marked capacitors and resistors have parts unmbers.
   The underlined indicates the switch position.

   This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.
5. SWITCHES:
   - S1 : POWER OFF - ON
   - S301 -1 : SP-A OFF - ON
   - S301 -2 : SP-B OFF - ON
   - S301 -3 : FL MUTE OFF - ON
   - S302 : INPUT SELECTOR CONTROL AMP - CD DIRECT - LINE DIRECT
   - S303 : TAP 8Ω - 4Ω

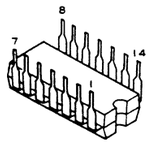
THE UNDERLINED INDICATES THE SWITCH POSITION

External Appearance of Transistors and ICs

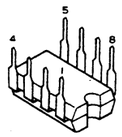
LC7555



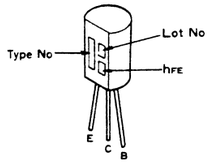
PA0016



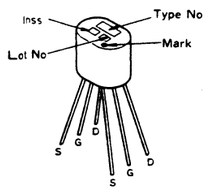
NJM4558DXC



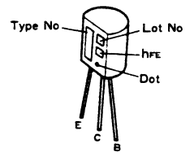
2SC1845
2SA992



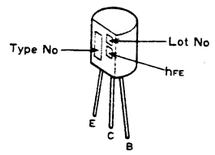
2SK129A



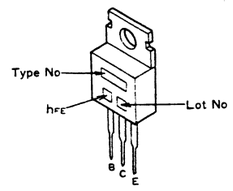
2SA1145P



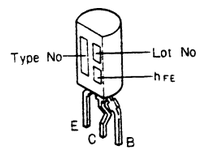
2SC2705P



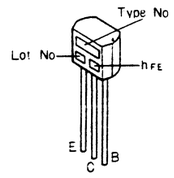
2SC2238B
2SA968B
2SD836A
2SD880
2SB750B



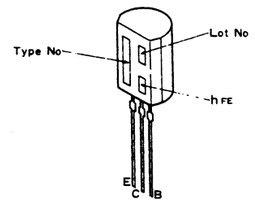
2SC2235(A)
2SA965(A)



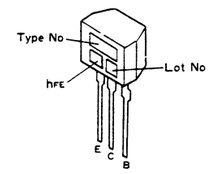
2SC2603



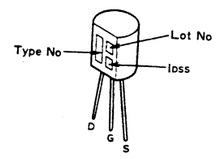
2SD438



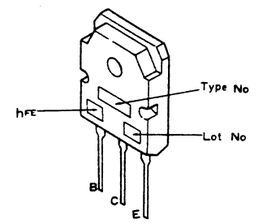
2SC1740S



2SK170
2SJ74



2SA1516P(A)
2SC3907P(A)



7. ELECTRICAL PARTS LIST

NOTES:

- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*
  Ex. 1 *When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).*

560Ω	*56 × 10¹*	*561*	*RD¼PS 5 6 1 J*
47kΩ	*47 × 10³*	*473*	*RD¼PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RS1P 0 1 0 K*

  Ex. 2 *When there are 3 effective digits (such as in high precision metal film resistors).*

5.62kΩ	*562 × 10¹*	*5621*	*RN¼SR 5 6 2 1 F*

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts marked by " ⊙ " are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

Miscellaneous Parts

P.C. BOARD ASSEMBLIES

Mark	Symbol & Description	Part No.
	Power amp A assembly	AWZ1025
	Power amp B assembly	AWZ1026
	FL assembly	AWZ1037
	Buffer amp assembly	AWZ1036
	SP Terminal A assembly	Non supply
	Power amp C assembly	Non supply
	Power amp D assembly	Non supply
	Chemical condenser L assembly	Non supply
	Chemical condenser R assembly	Non supply
	Switch A assembly	Non supply
	Switch B assembly	Non supply
	Switch C assembly	Non supply
	Volume assembly	Non supply
	Terminal assembly	Non supply
	Fuse assembly	Non supply
	Relay assembly	Non supply

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
⚠ ★★	Q1–Q8	2SA1516P(A)
⚠ ★★	Q9–Q16	2SC3907P(A)

SWITCH

Mark	Symbol & Description	Part No.
⚠ ★★	S1 Push switch (POWER)	ASG-553

TRANSFORMERS

Mark	Symbol & Description	Part No.
⚠ ★	T1 Power transformer (Lch) (220V, 240V)	ATS1011
⚠ ★	T2 Power transformer (Rch) (220V, 240V)	ATS1012

CAPACITORS

Mark	Symbol & Description	Part No.
⚠	C509 Ceramic capacitor (0.01μF/150V)	ACG-019
⚠	C503, C508, C510 Ceramic capacitor (0.01μF/400V)	ACG-502
⚠	C504, C505 Ceramic capacitor	CKDYB102K500
⚠	C501, C502, C506, C507 (Ceramic capacitor)	CKDYB472K500

FUSES

Mark	Symbol & Description	Part No.
⚠ ★★	FU3, FU4 Fuse (T800mA)	AEK-031
⚠ ★★	FU1, FU2 Fuse (T3.15A)	AEK-042

OTHERS

Mark	Symbol & Description	Part No.
⚠	Terminal 4P (SPEAKERS)	AKE-110
	Terminal (GND)	AKM-039
⚠	AC Power cord	ADG-041

Power Amp B Assembly (AWZ1026)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC102 NSC2 IC	PA0016
★★	Q102	2SK129A
★★	Q104, Q106, Q108, Q110, Q112, Q128, Q138–Q141	2SC1845
★★	Q114, Q142	2SA992
★★	Q116, Q122	2SA1145P
★★	Q118, Q120	2SC2705P
★★	Q124	2SC2238B
★★	Q126	2SA968B
★★	Q130	2SC2235(A)
★★	Q132	2SA965(A)
★★	Q133	2SD836(A)
★★	Q143	2SC1845
★★	Q144, Q146, Q147	2SC2603
★★	Q145	2SD438
★	D102, D104, D110, C112, D114, D133, D135	1IE2
★	D106, D108, D136, D138, C140, D142, D144, D146, D150, D152	1SS131
★	D116, D118, C120, C122	RD39EB
★	D124, D126	1S2471
★	D134	KZL061

COIL

Mark	Symbol & Description	Part No.
	L102 (2.7μH)	ATH1001

CAPACITORS

Mark	Symbol & Description	Part No.
	C102	CMA221J500
	C104	CQSXA562J160
	C106 (470μF/50V)	ACH-455
	C108, C110	CMA390J500
	C112	CQSXA471J160
	C114	ACE-066
	C116, C118	CMA680J500
	C120	CMA151J500
	C122, C124	CMA101J500
	C126	CEANP2R2M100
	C128, C130	ACE-067
	C132, C134	CEXA331M2A
	C136, C138	CEXA471M2A
	C143	CEAS470M25
	C149, C150	CEAS331M10
	C151	CEAS330M16
	C152	CEAS3R3M50
	C154	CKCYB102K50
	C157	CEAS220M25

RESISTORS

Note: When ordering resistors, convert the resistance value into code from, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
	R156	RD1/4PMFL681J
	R249, R250, R251, R252, R253, R254, R255, R266	RD1/4PM□□□J
	R124, R126, R134, R138, R152, R154, R158, R160, R162, R174, R176, R248	RFA1/4PS□□□J
	R172, R178, R180	RS2LMF□□□J
	R170, R256	RS1LMF□□□J
	R106, R122, R130, R132, R136, R258	RDR1/2PM□□□J
	Other resistors	RDR1/4PM□□□J

Power Amp A Assembly (AWZ1025)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC101 NCS2 IC	PA0016
★★	Q101	2SK129A
★★	Q103, Q105, Q107, Q109, Q111, Q127	2SC1845
★★	Q113	2SA992
★★	Q115, Q121, Q134	2SA1145P
★★	Q117, Q119	2SC2705P
★★	Q123	2SC2238B
★★	Q125	2SA968B
★★	Q129	2SC2235
★★	Q131	2SA965
★★	Q135, Q148	2SD880
★★	Q136	2SD836A
★★	Q137	2SB750B
★	D101, D103, D109, D111, D113	1IE2
★	D105, D107, D137, D139, D141 D143, D145, D147, D149, D151	1SS131
★	D115, D117, D119, D121	RD39EB
★	D123, D125	1S2471
★	D127–D130	10E2FD
★	D131, D132	RD13EB
★	D148	RD12EB

COIL

Mark	Symbol & Description	Part No.
	L101 (2.7μH)	ATH1001

CAPACITORS

Mark	Symbol & Description	Part No.
	C101	CMA221J500
	C103	CQSXA562J160
	C105 (470μF/50V)	ACH-455
	C107, C109	CMA390J500
	C111	CQSXA471J160
	C113 (0.01μF/100V)	ACE-066
	C115, C117	CMA680J500
	C119	CMA151J500
	C121, C123	CMA101J500
	C125	CEANP2R2M100
	C127, C129 (0.1μF/100V)	ACE-067
	C131, C133	CEXA331M2A
	C135, C137	CEXA471M2A
	C139	CEAS102M25
	C140	CEAS471M25
	C141, C142	CEAS101M16
	C144, C145, C146, C153, C155	CEAS470M25
	C147, C148, C156	CEAS100M50

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
	R105, R121, R129, R131, R135, R259	RDR1/2PM□□□J
	R241–R243	RD1/2PM□□□J
	R155	RD1/4PMFL681J
	R244–R246, R268, R269	RD1/4PM□□□J
	R151, R153, R157, R159, R161, R173, R175, R123, R125, R133, R137	RFA1/4PS□□□J
	R169	RS1LMF100J
	R171, R177, R179, R267	RS2LMF□□□J
	Other resistors	RDR1/4PM□□□J

FL Assembly (AWZ1037)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC401, IC402, IC403	NJM4558DXC
★★	IC404	LC7555
★★	Q401	2SC1740S
★★	TH401, TH402	TH101
★	D401–D410	1SS131
★	D412–D414	AEL-460
★	D433–D435	1SS131
★	D436	RD8.2ESB3

CAPACITORS

Mark	Symbol & Description	Part No.
	C401, C402	CEAS102M6
	C405, C406	CEJA100M16
	C407, C408	CEAS010M50
	C409, C410	CEAS2R2M50
	C411	CEASR68M50
	C412	CQMA102J50
	C417	CEAS100M25

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
	R449–R452	RD1/4PM4R7J
	R441–R443	RD1/4PM102J
	Other resistors	RD1/8PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
★	V401, V402 Fluorescent indicator tube	AAV1003
★	PL401 Lamp (Red)	AEL1006
★	PL402 Lamp (Yellow)	AEL1007

Buffer Amp Assembly (AWZ1036)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	Q301, Q302	2SK170
★★	Q303, Q304	2SJ74
★★	Q305, Q306	2SC1845
★★	Q307, Q308	2SA992
★	D301, D302	11E2

RELAYS

Mark	Symbol & Description	Part No.
★★	RY301, RY302 Relay (INPUT SELECTOR)	ASR1004

CAPACITORS

Mark	Symbol & Description	Part No.
	C309, C310	CEYA220M50

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
	R307–R322, R330–R333	RDR1/4PM□□□J
	R339	RD1/4PM010J

SP Terminal Assembly

CAPACITORS

Mark	Symbol & Description	Part No.
	C1, C2, C5, C6	CKDYB102K500

RESISTORS

Mark	Symbol & Description	Part No.
	R1, R2	RD1/4PM100J

Power amp C Assembly

RESISTORS

Note: When ordering resistors, convert the resistance value into code from, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
	R207, R209, R211, R213 (2W+2W, 0.47x2)	ACN-118
	R191, R193, R195, R197, R199, R201, R203, R205	RFA1/4PS4R7J
	Other resistors	RD1/4PMF□□□J

Power amp D Assembly

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
	R208, R210, R212, R214 (2W+2W, 0.47x2)	ACN-118
	R192, R194, R196, R198, R200, R202, R204, R205	RFA1/4PS4R7J
	Other resistors	RD1/4PMF□□□J

Chemical Condenser L Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D415, D417, D419, D421, D423, D425, D427, D429	31DF2FC
★	D431	10E2FD

RELAY

Mark	Symbol & Description	Part No.
★★	RY401 Relay (4Ω/8Ω)	ASR1001

CAPACITORS

Mark	Symbol & Description	Part No.
	C413, C415 (1200μF/100V)	ACH1004

Chemical Condenser R Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D416, D418, R420, D422, D424, D426, D428, D430	31DF2FC
★	D432	10E2FD

RELAY

Mark	Symbol & Description	Part No.
★★	RY402 Relay (4Ω/8Ω)	ASR1001

CAPACITORS

Mark	Symbol & Description	Part No.
	C414, C416 (1200μF/100V)	ACH1004

Switch A Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	Q309	2SC2603
★★	Q310	2SC1740S
★	D306	11E2
★	D307	RD5.6EB

SWITCH

Mark	Symbol & Description	Part No.
★★	S303 Slide switch (SPEAKER IMPEDANCE)	ASH-015

CAPACITOR

Mark	Symbol & Description	Part No.
	C313	CEJA100M50

RESISTOR

Mark	Symbol & Description	Part No.
	R327	RD1/4PM274J

Switch B Assembly

SWITCH

Mark	Symbol & Description	Part No.
★★	S302 Rotary switch (INPUT SELECTOR)	ASE1001

Switch C Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★	D305	11E2

RELAY AND SWITCH

Mark	Symbol & Description	Part No.
★★	RY305 Relay (HEADPHONE ON/OFF)	ASR1003
★★	S301 Push switch (SPEAKERS A/B, DISPLAY ON/OFF)	SUL8LXXXS

CAPACITORS

Mark	Symbol & Description	Part No.
	C311, C312	CKCYB392K500

RESISTORS

Mark	Symbol & Description	Part No.
	R323, R324	RS3LMF331J
	R325, R326	RS2LMF331J

OTHERS

Mark	Symbol & Description	Part No.
	PHONE JACK (HEAD PHONE)	AKN1002

Volume Assembly

RESISTORS

Mark	Symbol & Description	Part No.
★	VR301 Volume (CD/LINE INPUT LEVEL)	ACW1002
	R336, R337	RDR1/4PM751J

Fuse Assembly

COILS

Mark	Symbol & Description	Part No.
⚠	L301 (300μH)	ATF1006

CAPACITORS

Mark	Symbol & Description	Part No.
⚠	C314 Ceramic capacitor (0.01μF/400V)	ACG-502

Terminal Assembly

CAPACITORS

Mark	Symbol & Description	Part No.
	C301–C308	CQSXA391J160

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
	R301–R306, R328, R329, R334, R335	RDR1/4PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	Terminal 4P (CONTROL IN, CD/LINE OUT)	AKB1003

RELAY Assembly

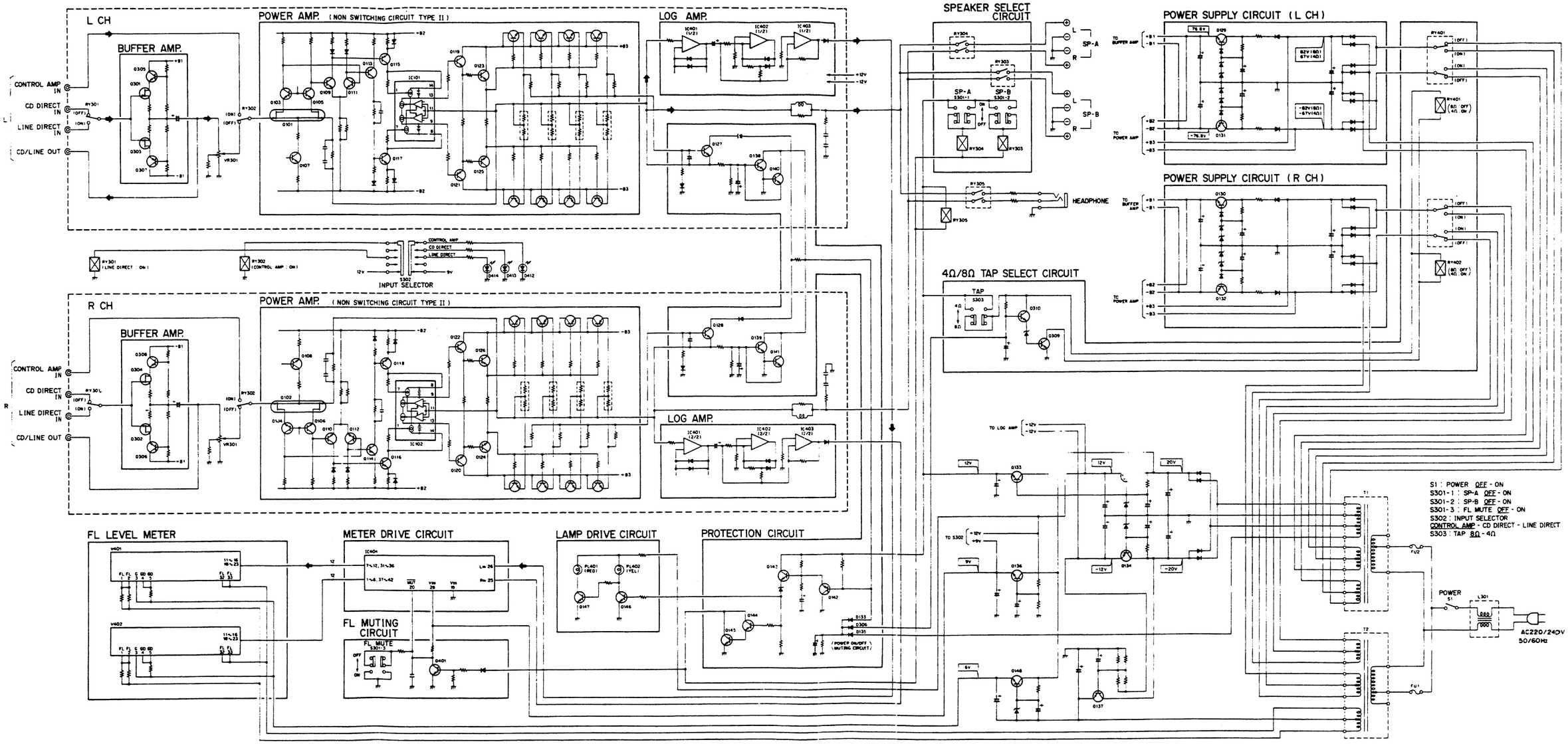
SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D303, D304	11E2

RELAIES

Mark	Symbol & Description	Part No.
	RY303, RY304 Relay (SPEAKERS A/B)	ASR1002

8. BLOCK DIAGRAM



9. CIRCUIT DESCRIPTIONS

INPUT SYSTEM

There are 3 input terminals comprising CONTROL AMP CD DIRECTION IN and LINE DIRECT IN selection of signals from CD DIRECT IN and LINE DIRECT IN input are made by the switch and after being routed through the buffer amp and CD INPUT level volume are once again selected by the SW together with the signal from the Control Amp. If CD/LINE signals are also used for such components as pre-amp and tape deck, the above buffer amp output is routed through the LINE OUT terminal.

POWER AMP SECTION

Selected signals from the input SW (S302) are input to the power amp which comprises a 2 stage differential Non Switching Circuit TYPE II and a 3 stage Darlington.

Due to use of the Non Switching Circuit TYPE II:

- Low distortion
  Distortion at the output stage has been suppressed by 1/30 over previous models.
- Fluctuations in idle current just after switching POWER ON and also at the time of changes in signal level can be immediately stabilized with the present model.
- Non switching distortion can be supplrssed.

The kind of circuitry used in the M-90 has the high power and low load drive performance for (20Hz~20kHz 0.003%) 200W/8Ω.

OUTPUT SYSTEM

Output from the power amp is routed through the Protection relay (RY303, RY304) and output to the speaker terminals A, B. For output to the headphone terminal, power amp output is passed through the special muting relay (RY305).

POWER METER (FL) ACTIVATOR CIRCUIT

Power amp output is compressed by the LOG AMP and input to the PEAK HOLD circuit which drives a 12 point bar display.

PROTECTOR CIRCUIT

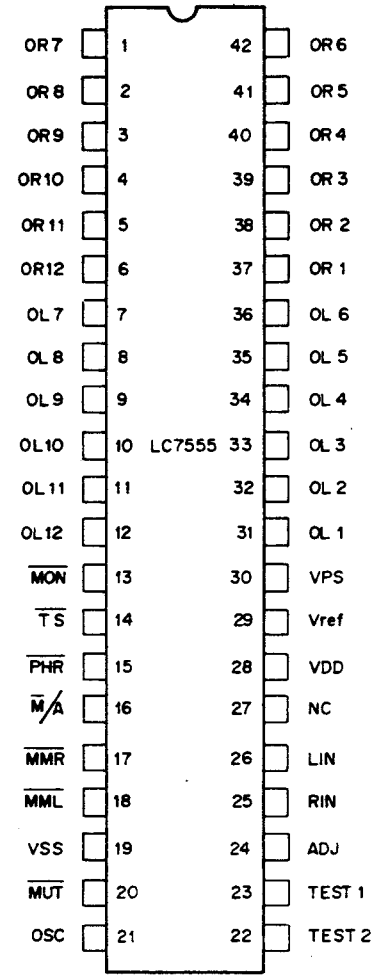
When there is overload and direct current output at the power amp output, the protector circuit will detect it, open the Protection relay and prevent to the amp and speakers. The Protection relay is also opened during POWER ON/OFF so there is no sudden loud emission.

POWER SYSTEM

The power source to the power amp and CD buffer amp is perfectly separated for Lch and Rch as are the transformers. Power to the control system is also supplied by special transformer coils and the coils for the FL heater are separate too, so mutual interference is prevented.

10. IC DESCRIPTIONS

Peak Hold Level Meter IC.



(Note) : NC Terminal should be open

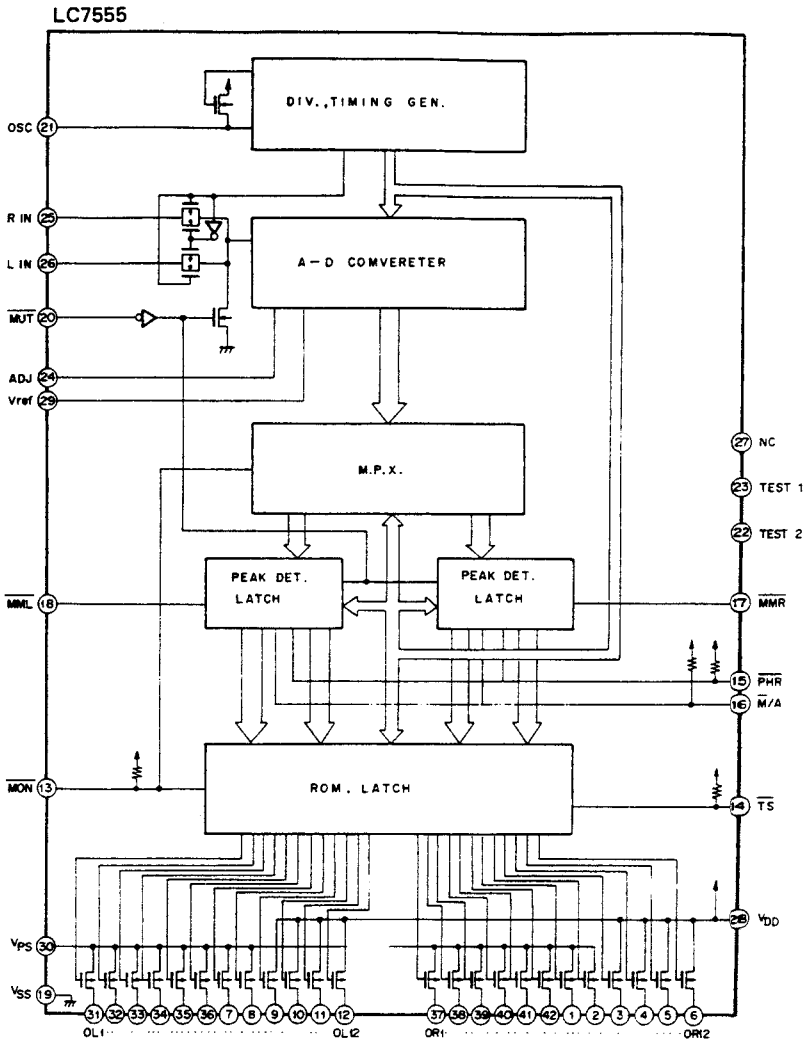
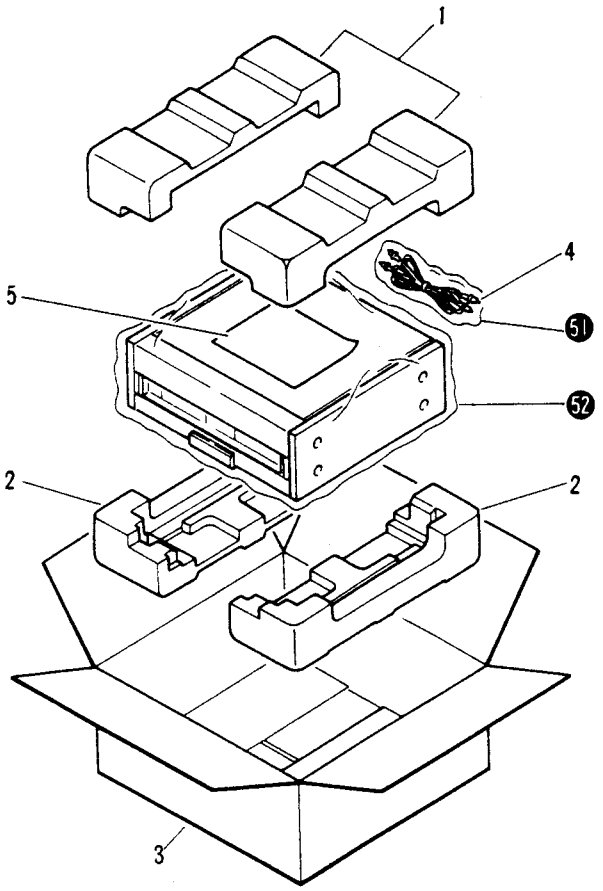


Fig. 10-1 Distribution of pins and block diagram for LC7555

11. PACKING

Parts List of Packing

Mark	No.	Part No.	Description
	1	AHA1003	Top pad
	2	AHA1034	Bottom pad
	3	AHD1013	Packing case
	4	ADE1012	Connection cord with plug
	5	ARC1002	Operating instruction
	51		Vinyl
	52		Seat



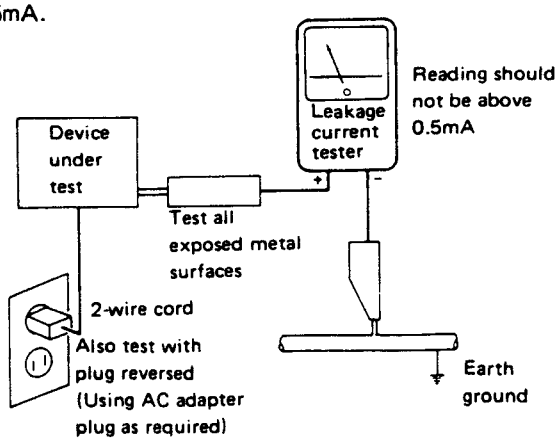
12. SAFETY INFORMATION

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.


Leakage current tester
Reading should not be above 0.5mA
Device under test
Test all exposed metal surfaces
2-wire cord
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.